

THE CHEIRIDIINÆ OF NORTH AMERICA  
(Arachnida-Pseudoscorpionida)

BY JOSEPH CONRAD CHAMBERLIN

*Stanford University, California*

It is of more than ordinary interest to be able to report the presence of this subfamily in North America. Two western American species have been discovered and are here named. *Cheiridium museorum* Leach, a domestic species which has been widely dispersed by commerce, is briefly included inasmuch as it will also surely, sooner or later, become a member of our fauna. Since no adequate definition of the sub-family is readily available in the literature an attempt is made to give one here.

Measurements are taken as described by Chamberlin (1923, Proc. Cal. Acad. Sci. XII: 356-357: f.) with the following changes. The length of the hand is omitted and the breadth of the base of the movable finger of the claw is added. Four coxal measurements of each of the coxæ of the palpus, leg I and leg IV are added. These are: greatest length, greatest breadth, accessory length and accessory breadth, and they are taken as indicated in Fig. A. Total length is of cleared, stained (expanded) specimens, and is exclusive of the chelicerae. Three carapacial measurements are here given, these are, median length, anterior breadth (across the eyes) and the posterior breadth, all tabulated in the order given. The cucullus length is from the anterior margin of carapace to a line drawn between the centers of the two eyes. For the chelicerae in this same order are given the length and breadth of the basal finger or segment, and the length of the movable finger.

All measurements are in terms of the length of the femur of the palpus. K is simply the length of the femur of the particular specimen measured, in millimeters. K times any measurement will give that measurement in millimeters. The "JC" numbers are my personal catalogue numbers of the specimens under consideration. All are in my personal collection including types. Male and female paratypes of *Apocheiridium ferumoides* are deposited in the California Academy of Sciences; Department of Entomology at Stanford; Museum of Comparative Zoology and the British Museum of Natural History. Mr. E. O. Essig of the University of California is the original discoverer of this species.

## CHEIRIDIINÆ Hansen

1894, Hansen, Ent. Med. udg. For. Copenhagen. IV:232.

Diagnosis: All tarsi single segmented, I & II sub-equal in length to tibiæ, III & IV shorter than tibiæ; all femora undivided (I & II may show a vestigial articulation trace); claws simple; empodia undivided and sub-equal to claws; sternum absent; carapace posteriorly broader than long, sub-equilaterally triangular; eyes two, cucullus well developed; typically with a single broad carapacial furrow; abdomen broadly ovate, broadest medially; anus entirely ventral, borne on shield composed of fused 11th tergite and last sternite; tergites and sternites longitudinally divided; no tarsal nor abdominal pseudotactile setæ; stigmatic helix present but obscure; spiracular guard sclerite reduced to a chitinous border line; maxilla slightly or not at all overlaid by coxa I; lamina maxillaris well developed, non-serrately margined; median and posterior maxillary lyrifissures complete ovate loops; maxillary trochanteral foramen situated laterally, invisible from ventral aspect; palpal poison ducts absent; chelicerae small, all but base of hand visible from above; coxal area roughly triangular, narrowing anteriorly; typically extremely and rugosely granulate on palpi and to a lesser degree on carapace and abdomen; palpal and dorsal setæ typically strongly curved, usually with a single dorsal tooth; small, much depressed, slowly moving forms, less than 2.0 mm. long.

Remarks. In addition to the above characters the American and European species are characterized by chelicerae bearing a small lamina interior; a laminiform serrula interior with an apical tooth and one or two scarcely dentate lobes; an eight or ten toothed serrula exterior attached throughout its length; by the presence of the terminal galeal seta, and the exterior, interior, basal and sub-basal setæ, the laminal seta being absent. One dorsal and one ventral cheliceral lyrifissure present. The tergal border setæ in both Cheiridium and Apocheiridium number between 22 and 28 per tergite; marginal lyrifissures number about 6 per tergite. Sub-terminal tooth of movable finger of chelicera vestigial.

As the result of investigations, as yet unpublished, it has been discovered that the tactile setæ of the claws typically number twelve throughout the order, but that occasionally in some groups, some of these are lost. It is also possible to more or less safely homologize these setæ. Typically there are four such setæ on the movable finger; four on the exterior surface of the fixed finger and four on its interior surface. These setæ I have named as indicated in Figs. J and U. Apparently the interior terminal seta of the fixed finger and the terminal and basal setæ of the movable finger are typically, if not always, absent in this subfamily. Some others may be present or absent.

The male genitalia presents a number of curious features. Of particular interest is the presence of typical genital sacs

(Fig. R) very similar to those that occur in most of the Obisiidæ and Garypinus, as well as in other groups. The rams-horn organs of the genus *Chelifer* are probably homologous with these sacs, merely being specialized for a particular function. In this particular group they are destroyed by boiling in KOH as is ordinarily done in making preparations and they are only observable in "uncooked," but cleared specimens. Likewise the curious grape-like clusters attached to the genitalia are of considerable interest (Fig. R). They appear to be homologous with the typical unimpaired median testis. They are probably characteristic of the subfamily at least.

All the species I have studied fall into two well marked genera. They may be separated by aid of the key.

Femoral angle pronounced; movable finger of claw with but a single tactile seta; 11 tergites visible from above....*Apocheiridium* genus nov.  
Femoral angle non-existent; movable finger of claw with two tactile setæ; 10 tergites only visible from above.....*Cheiridium* Menge.

#### ***Apocheiridium* Chamberlin, new genus**

Orthotype, *Apocheiridium ferumoides* sp. nov. North America: California.

Diagnosis: Terminal, sub-basal and basal setæ of movable finger absent; tactile setæ spaced as in Fig J; claw more or less turbinate; femoral angles pronounced; humeral angles obsolete; internal lateral chitin fold of coxa I pronounced; 11 segments visible from above; tergites 1 to 9, inclusive, longitudinally divided; anterior blade of flagellum broad as posterior two combined and at least slightly dentate anteriorly; posterior margin of trochanter evenly rounded; female with a row of three separate and distinct simple galeæ on each chelicera; male with two (or one) stylet-like galeæ similarly arranged; first four tergites distinctly narrowed, third narrowest, little more than half width of broadest ones.

Distribution. France, Italy, Sardinia, South Africa, Western United States, Western Mexico.

Remarks. The four species known to belong to this genus may be separated by means of the following key. All are superficially very similar and careful examination is necessary to distinguish them.

- 1, Claw 5.5 times as long as width of tibia; femur about 4.3 times as long as greatest breadth; from Idaho, Utah.....*mormon* sp. nov.
- , Claw 4.6 or less times as long as width of tibia; femur less than 3.9 times as long as greatest breadth.....2.
- 2, Tibia 2 times or less longer than breadth of claw; genital loops of male distinctly longer (without pedicel) than lateral diameter of x-sac; California.....*ferumoides* sp. nov.
- , Tibia 2.3 or more times as long as breadth of claw; genital loops of male much shorter than lateral diameter of x-sac; old world species ..... 3.



- 3, Small species, less than 1 mm. long; granulations of femur much reduced, no, or very few, large, tooth-like granules; tibia at least 2.5 times as long as width of trochanter; South Africa.....  
 .....*Apocheiridium* (un-named) sp. nov.  
 —, Larger species, distinctly more than 1 mm. long; granulations of femur pronounced, numerous very large tooth-like granules; tibia less than 2.4 times as long as width of trochanter; Europe.....  
 .....*ferum* (Simon)

***Apocheiridium ferumoides* Chamberlin, new species**  
 (Fig. B-F, H, K-P, R-S, V, X-Y, AA)

Types. Holotype ♂, JC, 194.01007; allotype ♀, JC, 194.01008. Stanford University, California. Under bark of *Eucalyptus globulus*.

Other material. Type collection of 260 specimens, Stanford University, California. Under bark of *Eucalyptus globulus*. In addition to this collection I have at hand specimens from the following localities. California: Berkeley, University of California campus, under bark of *Eucalyptus*; Atherton, San Mateo County, from under bark of log of *Cupressus macrocarpa* and stump of *Pinus radiata*; Jasper Ridge, San Mateo County, under bark of dead white oak; La Honda, San Mateo County, under bark of *Sequoia sempervirens*; Big Basin, Santa Cruz County, under bark of *Sequoia sempervirens*. In last two collections only shed skins are included, taken from the abundant moulting nests present. These nests are often excessively abundant under bark slabs; they are pure white, flat, circular silken capsules about 2.3 mm. in diameter. Mexico: a single immature specimen (JC-179.01005) belonging certainly to this genus and possibly to this species was presumably taken under the bark of a mesquite tree at Mulegé, Lower California, in company with *Garypinus corticolus* J. C. Chamb. It is not entirely impossible that the presence of this specimen in the vial of Mexican material was fortuitous but this appears to be rather doubtful and I am inclined to believe the record valid. The galea which is entirely typical is shown in Fig. G.

Diagnosis. Male: Palpi stout (Fig. AA); claw strongly turbinate; tibia relatively short, measuring about 0.8 as long as femur; carapacial furrow comparatively deep; trochanter, anterior margin of femur, femoral angle and to a slight degree the anterior margin of the tibia, with numerous large tooth-like tubercles; carapace and tergites with typical pseudoscales modified into striking stellate rugosities (Fig. X); sub-basal seta of chelicera distinctly toothed (Fig. D); galea of two stylets, one small, well developed, typically simple, the other much smaller, vestigial (Fig. H); genitalia distinctive (Fig. L & M); genital loops with long pedicels, elbowed near their point of union with the paired anterior apodeme; genital loop distinctly longer than lateral diameter of the more or less flattened elliptical x-sac; median loop

strongly acute, V-shaped; 9 grape-like testicular clusters (Fig R); genital sacs large beyond genital loops; attachments not made out.

Measurements: JC-196.01001. Total length, 1.38 mm. K, 0.383 mm. Carapace (1.14-0.71, 1.35). Chelicerae (0.27-0.13, 0.2). Palpus (0.6-0.33, 0.51-0.45) (0.47-0.33) (1.0-0.27) (0.82-0.27) (1.24-0.39) (0.64-0.14). Leg I (0.24-0.41, 0.42-0.47) (0.21-0.17) (0.49-0.18) (0.33-0.12) (0.32-0.09). Leg IV (0.14-0.52, 0.64-0.62) (0.27-0.18) (0.73-0.15) (0.48-0.14) (0.43-0.09). Cucullus, 0.22. Abdomen breadth, 2.06.

Female: Essentially as in male; central cribriform plate lightly chitinized, with few pores; lateral plates of characteristic irregular shape (Fig. N), pores apparently very minute; chaetotaxy as indicated.

Measurements: JC-195.01001. Total length, 1.57 mm. K, 0.394 mm. Carapace (1.12-0.65, 1.38). Chelicerae (0.25-0.12, 0.19). Palpus (0.59-0.34, 0.50-0.44) (0.47-0.32) (1.00-0.26) (0.80-0.27) (1.23-0.40) (0.65-0.15). Leg I (0.27-0.43, 0.41-0.44) (0.20-0.16) (0.48-0.18) (0.32-0.12) (0.31-0.08) Leg IV (0.15-0.53, 0.65-0.62) (0.26-0.15) (0.73-0.18) (0.48-0.12) (0.40-0.09). Cucullus, 0.23. Abdomen breadth, 2.06.

Remarks. It is interesting to note the asymmetrical development of the genital loops in specimen shown in Fig. M. Typically they are as in Fig. R. The lateral cribriform plates of the female are variably placed, depending upon the amount of distortion produced in making the preparation. Most closely related to *A. mormon* sp. nov.

***Apocheiridium mormon* Chamberlin, new species**  
(Fig. J, JJ, P-Q, Z)

Material. The holotype, ♂ JC-188.01001. Fish Haven (Bear Lake), Idaho. Coll. J. C. C. Under bark of mountain mahogany (log in woodpile). IX/8/21.

Diagnosis. Male: Palpi slender (Fig. Z); claw turbinate; tibia relatively long, being about 0.86 as long as femur; granulation of palpus less prominent than in *ferumoides*; carapace and tergites with pseudo-scales of a rugosely scaled appearance, not stellately roughened as in *ferumoides*; genitalia differs from that of *ferumoides* in that the x-sac is somewhat more heavily chitinized; the median loop is more heavily chitinized and is anteriorly acutely angled, rather semi-circular in outline; genital loops much as in *ferumoides*, but shorter, and, without the pedicel, sub-equal to the lateral diameter of the x-sac (Fig. Q). (Due to faulty preparation genitalia could not be worked out with the accuracy and completeness possible in *ferumoides*.)

Measurements: Total length, 1.35 mm. K, 0.325 mm. Carapace (1.18-0.68, 1.43). Chelicerae (0.29-0.15, 0.21). Palpus (0.57-0.39, 0.50-0.43) (0.50-0.32) (1.00-0.23) (0.86-0.24) (1.33-0.36) (0.71-0.14). Leg I (0.21-0.46, 0.45-0.54) (0.21-0.18) (0.54-0.19) (0.36-0.12) (0.37-0.09). Leg IV (0.16-0.59, 0.68-0.70) (0.29-0.18) (0.77-0.18) (0.50-0.12) (0.43-0.10). Cucullus, 0.23. Abdomen breadth, 2.10.

Remarks. Most closely related to *ferumoides* as indicated by genitalia. In some respects this species seems to be intermediate between *ferum* and *ferumoides*, not of course in the sense that it is an intergradation.

## APOCHEIRIDIUM FERUM (Simon)

1879, *Cheiridium ferum* Simon. Arach. France. VII:44; Pl. XVII; f. 21.

This species which is native to southern France, Italy and Sardinia differs very distinctly from the American forms in the genitalic structures. The carapacal and tergal reticulations are much as in *mormon*. It is being fully treated in another paper and need not be considered further here. In regard to the reported occurrence of this species in South Africa see below.

## Apocheiridium, un-named new species

1912, *Cheiridium ferum* Simon, Ellingsen, Ann. South African Mus. X:86 and 104. (Misdet.)

This species as indicated in the preceding key is not *Cheiridium ferum* as Ellingsen supposed. It is however most closely related to *ferum* with which it agrees in the general type of the genitalic structures and in the tendency toward the obliteration of the carapacal furrow. It differs strikingly in the matter of the scarcity of the large tooth-like granulations so characteristic of the other forms. The characters used in the key will easily separate the two species.

Inasmuch as Mr. John Hewitt of the Albany Museum at Grahamstown is at present working on the Pseudoscorpions of South Africa I am leaving the formal naming of this species to him.

## CHEIRIDIUM Menge

1855, *Cheiridium*, Menge, Ueber die Scheerenspinnen, Chernetidæ, 36.

Haplotype, *Chelifer muscorum* Leach. Europe, Cosmopolitan.

Diagnosis: Terminal and basal setæ of movable finger of claw absent; setæ spaced as in Fig. U; claw not turbinate, more or less ovate; femoral angle obsolete; humeral angle prominent; internal chitin fold of coxa I absent; but 10 segments visible from above; tergites 1 to 10, inclusive, divided by a longitudinal suture; movable finger of chelicera bearing a single small unbranched galea (apparently no sexual difference); anterior blade of flagellum as broad as posterior two combined, with its anterior margin perfectly smooth (Fig. I); posterior margin of trochanter distinctly and acutely angled; third tergite distinctly although slightly narrower than others, differentiation not nearly so marked as in Apocheiridium.

Definitely known to include but two species, the type and a fossil from the baltic amber, (*Cheiridium hartmanni* Menge). Four other species heretofore included in this genus must ultimately be otherwise disposed of. This is impossible to accomplish in the absence of material and hence they are here left as an appendix to the type genus. They are *Cheiridium tetrophthalmum* Daday (really a Garypoid form); *Cheiridium corticum* Balzan, (possibly belongs to Apocheiridium although this seems



doubtful); *Cheiridium subtropicum* Tullgren and *Cheiridium formosanum* Ellingsen, two apparently closely related species, will at least fall into a distinct genus.

According to Menge, and judging from his rather inadequate figures, *Cheiridium hartmanni* is very close to *Cheiridium museorum* but until a careful examination can be made of actual material of this former species no distinguishing line can be drawn between the two, except that *hartmanni* appears to be, in general, smaller.

#### CHEIRIDIUM MUSEORUM (Leach)

(Figs. A, I, T, U, W, BB)

1817, *Chelifera museorum* (Leach), Zool. Miscell. III:51.

1855, *Cheiridium museorum* (Leach), Menge, Ueber die Scheerenspinnen, Chernetidæ; 36:Pl. V; f. 11.

Material examined. Two males (JC-189) obtained by exchange from Louis Fage of Paris. Labeled simply as from "France."

Diagnosis. Male: Palpi slender, without large tooth-like tubercles (Fig. BB); carapace and tergites strongly tuberculate, of type shown in Fig. W; genitalia distinctive (Fig. T); genital loops much as in *A. ferumoides*; anterior apodemes heavy, anteriorly fused, basally with a prominent irregular perforation; median loop almost obliterated, fused with posterior apodeme which is similarly much contracted.

Measurements: JC, 189.01002. Total length, 1.28 mm.; X, 0.357 mm. Carapace (0.96-0.52, 1.17). Chelicerae (0.29-0.13, 0.20). Palpus (0.52-0.29, 0.45-0.39) (0.39-0.32) (1.00-0.22) (0.80-0.28) (1.30-0.39) (0.69-0.16). Leg I (0.29-0.26, 0.38-0.31) (0.23-0.19) (0.57-0.16) (0.42-0.13) (0.45-0.10). Leg IV (0.13-0.55, 0.62-0.57) (0.37-0.21) (0.84-0.19) (0.60-0.14) (0.59-0.10). Cucullus, 0.23. Abdomen breadth, 1.95.

Remarks. Recorded from all of Europe, South Africa, India, and generally regarded as cosmopolitan.

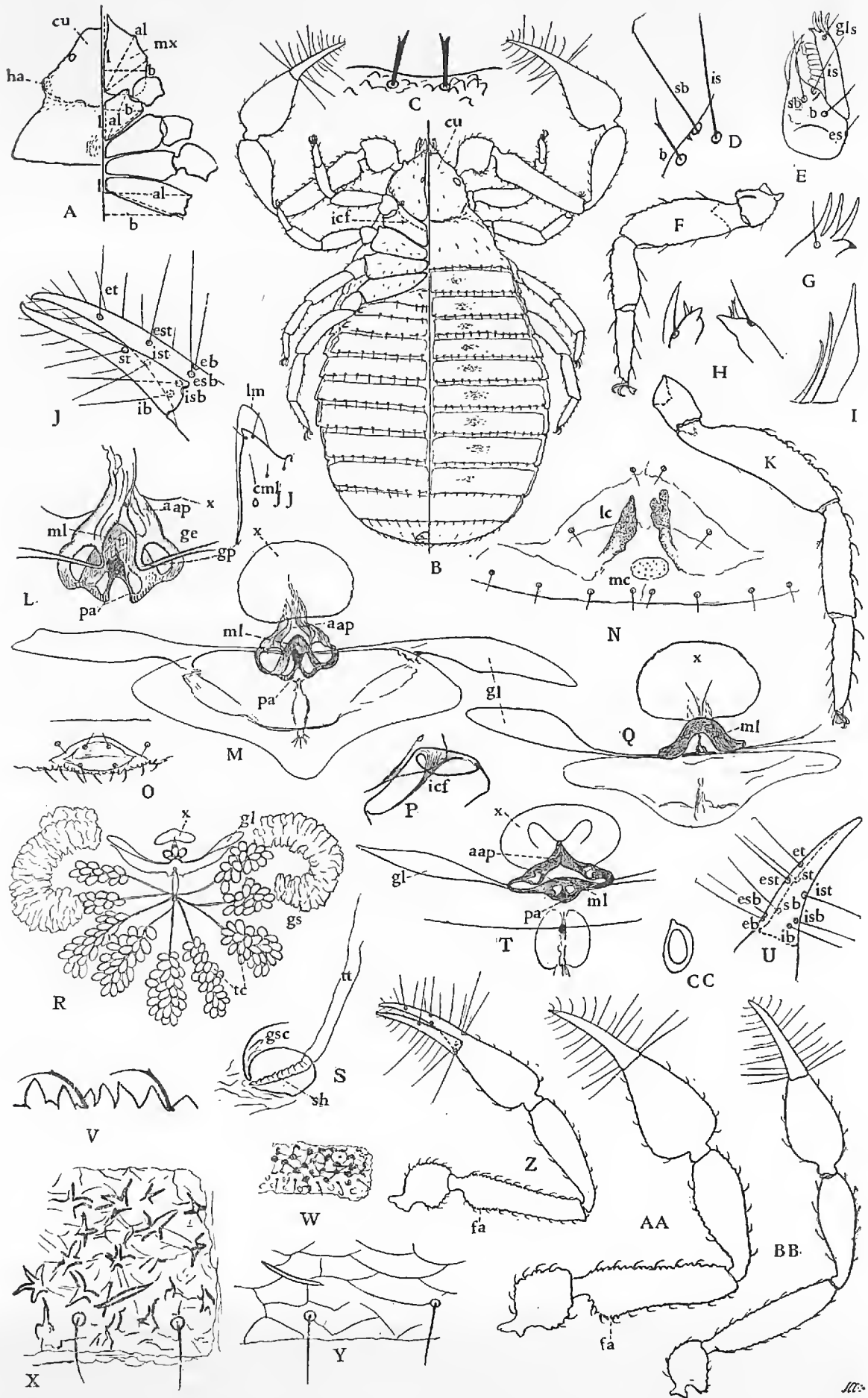
#### CAPTIONS FOR FIGURES

*Cheiridium museorum* Leach, ♂, 189.01002.

A, Carapace and coxæ; dotted lines indicate method of taking coxal measurements. I, Flagellum. T, Internal chitinous structures of genitalia. U, Dorsal aspect of left claw, tactile setæ. W, Portion of tergite showing rugosity. BB, Ventral aspect of left palpus.

*Apocheiridium ferumoides* sp. nov.

B, General aspect; left, ventral—right, dorsal. ♂, 194.01001. C, Margin of cucullus, note toothed setæ. ♂, 194.01001. D, Dorso-lateral aspect of left chelicera showing tactile setæ. 194.0—. E, Dorso-lateral aspect of right chelicera. ♀, 195.01001. F, Leg I: Vestigial articulation (apparent on one side of leg only) indicated by dotted line. ♀, 195.01001. H, Tips of chelicerae showing galeæ. ♂, 194.01001. K, Leg IV: ♀, 195.01001. L, Dorsal aspect of central chitinous structures of male genitalia. ♂, 196.01001. M, Ventral aspect of chitinous structures of male genitalia. ♂, 196.01001. N, Epyginum, chætotaxy and cribriform plate. ♀, 190.01005. O, Anus, entirely ventral. ♀, 195.01001. R, General aspect of male





genitalia in "uncooked" specimen; note genital sacs and peculiar testicular (?) clusters. ♂, 194.01001. S, Left anterior spiracle. ♂, 194.01001. V, Portion of anterior margin of femur of palpus showing toothed falciform setæ and tooth-like granulations. ♀, 194.01003. X, Portion of tergite showing "reticulations." ♂, 194.01006. Y, Portion of sternite showing "reticulations." ♀, 195.01001. AA, Ventral aspect of left palpus. ♀, 194.0— . CC, Median maxillary lyrifissure. ♀, 194.01003.

*Apocheiridium* sp. (possibly *ferumoides*)

G, Galea. ☉, 179.01005.

*Apocheiridium mormon* sp. nov. ♂, 188.01001.

J, Ventro-lateral aspect of fingers of claw, tactile setæ. P, Coxa of leg I showing internal lateral chitin fold. Q, Ventral aspect of male genitalia. (Considerably distorted due to faulty preparation; should appear more similar to *ferumoides* except for differences shown in x, ml and gl.) Z, Ventral aspect of left palpus.

### Structural abbreviations used

#### Tactile setæ of claw

t, terminal seta; st, sub-terminal seta; sb, sub-basal seta; b, basal seta.

Without letter prefixed indicates movable finger. With a prefix of "e" indicates exterior setæ of fixed finger; with "i," interior setæ of fixed finger.

#### Setæ of chelicerae

gls, galeal seta; is, interior seta; bs, basal seta; sbs, sub-basal seta; es, exterior seta.

#### Coxal measurements (A)

l, length; b, breadth; al, accessory length; undesignated line is for the accessory breadth.

#### Male genitalia

x, X-sac; gl, genital loop; gs, genital sac; tc, testicular clusters; ge, elbow of genital loop pedicel; gp, genital loop pedicel; aap, paired anterior apodeme; ml, median loop; pa, posterior apodeme.

#### Epyginum

mc, median cribriform plate; lc, lateral cribriform plate.

#### Miscellaneous

ha, humeral angle; cu, cucullus; mx, maxilla; fa, femoral angle; icf, internal lateral chitin fold of coxa I; cml, median maxillary lyrifissure; ml, lamina maxillaris. \_\_\_\_\_

## DOLICHOVESPULA DIABOLICA SAUSS. AND ITS SUPPOSED VARIETY FERNALDI LEWIS

(Hymenoptera, Vespidae)

BY CARL D. DUNCAN

*Stanford University, California*

A study of the 291 specimens comprised in the collection of Stanford University and that of the author, and to which one or the other of the above names may be applied, has led to the conclusion that they represent but one species which should be known as *Dolichovespula diabolica* Sauss., and which is not